

BIOLOGICAL OPINION SUMMARY
CLARK PEAK FIRE EMERGENCY SUPPRESSION AND REHABILITATION

Date of opinion: June 9, 1999

Action agency: U.S. Forest Service

Project: Clark Peak Fire Emergency Suppression and Rehabilitation

Location: Graham County, Arizona

Listed species affected: Endangered Mount (Mt.) Graham red squirrel (*Tamiasciurus hudsonicus grahamensis*) and threatened Mexican spotted owl (*Strix occidentalis lucida*).

Biological opinion: The emergency action is not likely to jeopardize the continued existence of the Mt. Graham red squirrel and is not likely to result in destruction or adverse modification of designated critical habitat such that it precludes recovery and survival of this species. The emergency action is not likely to jeopardize the continued existence of the Mexican spotted owl.

Incidental take statement:

Anticipated take: Fifteen Mt. Graham red squirrels are estimated to have been taken due to fire suppression actions. Eight Mexican spotted owls are estimated to have been taken due to fire suppression actions.

Conservation recommendations: Four are recommended for the Mt. Graham red squirrel. Two are recommended for the Mexican spotted owl.



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In Reply Refer To:

AESO/SE

2-21-96-F-286

June 9, 1999

Mr. John M. McGee, Forest Supervisor
Coronado National Forest
300 West Congress, 6th Floor
Tucson, Arizona 85701

Dear Mr. McGee:

The U.S. Fish and Wildlife Service has reviewed the biological assessment and evaluation and related documentation for the Clark Peak Fire Emergency Suppression and Rehabilitation located in Graham County, Arizona. Your request for emergency consultation was transmitted by telephone on April 25, 1996. Your request for completing the post-action formal consultation was received on September 4, 1996. This document represents the Service's biological opinion on the emergency action effects on the endangered Mount Graham red squirrel (*Tamiasciurus hudsonicus grahamensis*) and the threatened Mexican spotted owl (*Strix occidentalis lucida*) in accordance with section 7 of the Endangered Species Act of 1973, as amended, (16 U.S.C. 1531 et seq.).

In emergency situations such as wildfire, the action under consultation is the Forest Service's response to the emergency rather than the fire itself. This response may include suppression decisions and actions such as aircraft overflights, fireline construction, establishment of firefighting base and/or spike camps, and short-term emergency rehabilitation as noted in the Service's May 29, 1997, letter to the Forest Service. Long-term rehabilitation actions taken by the Forest Service such as salvage sales, etc., are not considered a part of the emergency response, and will require additional consultation if such actions "may affect" listed species or designated critical habitat.

This biological opinion is based on information provided in the August 30, 1996, biological assessment and evaluation, telephone conversations, field investigations and site visits, meetings, and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, fires or fire suppression and their effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file in our Arizona Ecological Services Field Office in Phoenix.

The Service finds the effects of the emergency action (decisions and actions of fire suppression and noted rehabilitation) associated with the Clark Peak fire, given the current status of the species and the environmental baseline, is not likely to jeopardize the continued existence of the Mt. Graham red squirrel. The Service believes that, while a portion of critical habitat was adversely affected by suppression action, far more would have been lost if not for fire

suppression action taken by the Forest Service (USFS 1999). Loss of this portion of critical habitat and associated middens due to fire suppression action does not preclude the continued survival and recovery of the red squirrel in the Pinaleno Mountains. Because of this, the Service finds the emergency action is not likely to result in destruction or adverse modification of designated critical habitat.

The Service finds the effects of the emergency action (decisions and actions of fire suppression and noted rehabilitation) associated with the Clark Peak fire, given the current status of the species and the environmental baseline, is not likely to jeopardize the continued existence of the Mexican spotted owl. Because Mexican spotted owl critical habitat has been withdrawn, no conferencing or consultation is required for critical habitat for this species.

Emergency consultation by the Forest Service with the Service was initiated by telephone on April 25, 1996. Service personnel visited the Clark Peak fire area three times (May 2, May 21-22, and June 11, 1996) during and after the emergency action. On September 27, 1996, a meeting regarding formal consultation was conducted (after the emergency action). Information regarding post-incident actions and assisting with formal consultation was received by the Service on September 4, 1996. A response to questions presented at a September 27, 1996, meeting was received by the Service on February 24, 1997. The Service received updated information from the Forest Service in March and April, 1999.

BIOLOGICAL OPINION

DESCRIPTION OF ACTION

The Clark Peak fire, started by undetermined human cause on April 24, 1996 (Froehlich 1996; Kvale 1996), began in the Pinaleno Mountains, Graham County, in southeastern Arizona. Reported on that date at 1652 hours, the fire was located in the area south of Riggs Lake and campground, and began to spread in a north and easterly direction towards Merrill Peak. The fire was approximately five to 10 acres in size when first flown over by a helicopter. By 1923 hours the fire had spread to over 100 acres. The Southeastern Arizona (SEAZ) Zone Incident Management Team (Team) was ordered at 1930 on April 24. Resource advisor(s) were available for input and information to the Team. Objectives given to the Team were to provide for public safety, provide for firefighter safety, and to protect threatened, endangered, and sensitive species habitat by minimizing acres burned and using direct attack for control strategy. Property values at risk included threatened and endangered species and their habitat, summer homes at Columbine, Columbine Administrative Site, Webb Peak Lookout, Riggs Lake Campground, Soldier Creek Campground, the Mt. Graham International Observatory, Bible Camp, Columbine Corrals, and Cunningham. Other property with the potential impacts from the fire included the rest of the campgrounds, Heliograph Electronic Site, and Turkey Flat.

The fire escaped initial attack and the size was estimated at 200+ acres by 0244 hours on April 25. On April 25, the Team attempted to control fire spread by utilizing Swift Trail (an Arizona State paved highway) on the north and using it as a burnout control point, backed up by engines and crews. The westward spread of the fire was successfully managed by using Type I

helicopters and hotshot crews. A bulldozer was used on Goudy Trail in an attempt to control the eastward fire spread. By this time, the fire had moved below the bulldozer line, forcing firefighters and equipment to retreat from this control feature. Approximately 72 chains of bulldozer line were constructed (one chain is equal to 66 feet). As a result of the fire's eastward spread, the Escaped Fire Situation Analysis was amended and updated to accommodate use of Soldier Creek Trail and ridgeline to control the fire's eastern movement. This strategy included using Swift Trail as a control feature and the ridge between Jesus and Babcock Canyons as a westward control feature by hotshot crews constructing handline. The southern front of the fire would be allowed to burn toward the desert and eventually run out of fuel. By late April 25, the fire had spread over two miles east and was dropping into Jesus/Goudy Canyon to the east.

On April 26, the Clark Peak fire made significant advances to the north and the east, outflanking the progress of burnout operations along Swift Trail. By April 26 at 1700 hours, the fire had moved four and one-half miles east towards Soldier Creek drainage and three miles downhill to the south. At 2200 hours, April 26, the fire had crossed the Swift Trail control line to the north. The northward advance was contained early on April 27 with total fire acreage estimated at 1,450 acres. The spot fires north of Swift Trail were contained and a secondary back-up bulldozer line (approximately 35 chains) was reconstructed with safety zone clearings along an old bulldozer line from Old Columbine north of Webb Peak and west to Chesley Flat.

The Clark Peak fire spotted northeast across Soldier Creek Trail on April 27. The spot fire was contained and held at 20 acres with the use of Type I and Type III helicopters. The spot occurred west of the Soldier Creek drainage. This spot fire area did not change substantially in the Soldier Creek drainage for about three days. The overall control strategy was changed to accommodate crew safety concerns about containing the spot fire which had moved over Soldier Creek Trail. The control strategy was amended to provide for additional structure protection, additional tractor line construction, and protective measures at the summer home site at Columbine and the astrophysical site. Tractor lines were constructed around the Webb Peak area to "box in" spot fires and "slopover" across Swift Trail. The tractor line started at Chesley Flat, aimed toward Webb Peak, then down an old fireline eastward and southward to Swift Trail near the Columbine summer home site area. The overall purpose behind the control strategy change was to use Moonshine Ridge as a control feature to stop the eastward fire spread and continue to use Swift Trail as a control feature on the north side of the fire. The fire moved southward down Goudy Canyon on April 28 and grew in the Soldier Creek drainage where spotting had occurred. The acreage of the Clark Peak fire was now at 2,076 acres at 1800 hours.

On April 27, structural protection measures were implemented at the Columbine summer homes and Columbine Administrative Site, and on April 29 at the observatory. A bulldozer line was constructed around the Columbine summer homes and administrative sites for a total of 160 chains. The University of Arizona was instructed to reduce fuels around the observatory within 50 feet of the perimeter of the site. At this stage in firefighting, fuel reduction included removal of a majority of dead and down fuels, some snags, and live ladder fuels (generally less than 9 inches diameter breast height) (dbh) within the designated perimeter. Approximately 70% of the dead and down wood within the perimeter was removed. The University also agreed to remove

the security fencing and install a temporary PVC sprinkler system around the perimeter of the site. At 2300 hours on April 29, the fire was estimated to be 2,735 acres in size.

On April 30, work continued to provide for structure protection at the astrophysical site, the Columbine summer homes, and the Columbine Administrative Site. Preparations for a burnout were begun along the bulldozer line constructed from Soldier Creek around the Columbine Administrative Site to Swift Trail and used the road southeast to Moonshine Ridge as control features. Handline construction was begun southwest down Moonshine Ridge. At 2030 hours on April 30, the fire was estimated at 2,905 acres in size. Acreage advances were on the southern flank of the fire.

Between May 1 and 2, all control features held, but the fire continued to increase in size as it spread south and downhill. Burnout of Swift Trail and around the Columbine Administrative Site began at 0700 hours on May 1. The management of the incident was in transition from the SEAZ Zone Type II Team to the Northern Rockies Type I Team. Hazard reduction work in the vicinity of the telescope continued as did the assignment of structure protection resources at the telescopes, Columbine Administrative Site, and the Columbine summer homes. The progress of the burnout was slow due to fire behavior and heat generated from the burnout operation. The burnout was completed in Soldier Creek. The total acreage for the fire at 1840 hours was 3,114 acres.

Burnout operations continued along the Swift Trail into the head of Post Creek on May 2. Some internal fire runs occurred in the Soldier Creek drainage; however, the Swift Trail control feature and burnout held the fire. The hotshot crews continued with handline construction down Moonshine Ridge. At 2000 hours on May 2 the fire was estimated to be 3,500 acres in size.

On May 3, burnout continued from Post Creek towards Moonshine Creek. In the late morning the fire began making runs from below up into the Post Creek/Moonshine Creek drainages and crossed Swift Trail. The fire made two discrete runs north of Swift Trail. One run came out of Moonshine Creek and spotted north and east towards Peak 10332 and Hawk Peak telescope site. The other run came out of Post Creek and spotted north towards Peak 10298, west of the telescope site. One heavy air tanker and two Type I helicopters were used successfully to stop the fire run toward the telescope. At 1930 hours on May 3, the fire had expanded to an estimated 5,877 acres in size.

On May 4, the two spot fires were at 400+ acres each and line (both hand and bulldozer) construction around them continued. Approximately 320 chains (four miles) of bulldozer line were constructed around the burned area north of Swift Trail. The burnout down Moonshine Ridge continued downhill towards the desert.

Burnout and holding operations down Moonshine Ridge were completed May 5. The fire made significant interior runs during the day which required the extensive use of Type I helicopters to control. At 1800 hours on May 5, the fire was holding at an estimated 6,716 acres in size.

Lining around the spot fires south and east of the telescope project was completed on May 6. Line construction from Grant Creek toward the west was begun in an effort to stop the downhill spread of the fire. Mop-up began on all but the southern divisions of the fire on May 7. No significant acreage increases occurred after this date.

On May 8, the fire was contained within a perimeter that encompassed an estimated 6,716 acres. This estimate included several spot fires which occurred outside the perimeter, but were still located inside control features (roads and bulldozer lines). Additional areas lined by bulldozer were used for secondary control and included lines around Webb Peak and the Mt. Graham International Observatory Site. Those secondary control areas were defined as a "contained area." This unburned, contained area encompassed an additional 689 acres, making the entire area within the perimeter 7,405 acres.

The fire created a mosaic of unburned and burned areas showing different intensities or fire activity. Fire and resource specialists mapped areas where hot or moderate burning occurred. Of the 7,405 total acres within the perimeter, approximately 2,965 acres were classified as hot or moderate burn intensity. The remaining acreage inside the perimeter burned lightly or not at all. The largest proportion of high intensity burn areas had occurred on steep slopes in canyons. Approximately 2,600 acres (18 percent) of the 14,200 acres of mapped old-growth forest in the Pinaleno Mountains were inside the perimeter of the fire; however, only 1,420 acres burned hot or moderately as determined from overlay analysis. The fire impacted the Goudy Research Natural Area located just east of Riggs Lake and south of Swift Trail. A little more than 375 acres of the 560-acre area burned hot or moderately. Of those acres, a small strip of area on the northern edge of the research natural area was affected by the burnout operation conducted from Swift Trail (Froehlich 1996).

The fire effects were variable due to varying fuel types and fuel loads throughout the area burned by the fire (Kvale 1996). Ponderosa pine burned hot due to high fuel loads. The pine-oak association generally burned the oak; very little of the pine seemed to be affected. The mixed-conifer association burned hot on steep slopes with much of the fire being carried through the canopy (a crown fire). The spruce-fir association burned as a stand-replacement fire area. Approximately 400 acres of spruce-fir burned near Columbine and the observatory.

Emergency response to the fire began with initial attack by Safford Ranger District firefighters but quickly escalated to additional resources as fire severity worsened. Initial attack suppression actions involved handline construction, burnout, and helicopter bucket drops. Early on April 25, the SEAZ Zone Type II Incident Management Team took over the fire management suppression efforts. The team continued to utilize handline construction, helicopter water drops, and burnout techniques and tactics aimed at fire suppression. Additional resources were ordered and deployed; heavy air tankers to drop retardant, engine strike teams with extensive hose lays, and Type I helicopters used for water and retardant drops. As the fire expanded south and east it moved into the adjacent Jesus/Goudy drainages. The team identified the limited control features available and decided to use bulldozers to rapidly build line on existing trails and old roads down identified ridgetop control points. Suppression actions applied used various combinations of these techniques and tactics until the fire was contained and controlled.

Approximately eight miles of handline and 11 miles of bulldozer line were constructed during the incident. Combined fixed- and rotary-wing air operations dropped approximately 600,000 gallons of water, 280,000 gallons of foam, and 320,000 gallons of retardant during the incident.

Additional suppression actions were taken to protect existing structures, ensure the safety of firefighters, pre-treat fuels, and influence fire behavior. These actions included falling trees and snags, bucking logs, fuel reduction and removal, and installation of a sprinkler system (at the observatory site). Trees and snags were dropped along Swift Trail wherever they threatened the integrity of the control feature. Felled trees were bucked (limbs were cut off) or cut in shorter lengths as a suppression action that reduced fuel near control lines and ensured firefighter safety. Most fuels were removed in a 50-foot radius around both the telescope site and the Columbine summer home sites to increase the odds for successful firefighter protection for these features. The sprinkler system installed at the observatory temporarily increased fuel moisture around the area.

Rehabilitation planning had begun as the fire was declared contained. Actions included bulldozer line and trail rehabilitation, hazard tree falling (or blasting if necessary), contour tree falling, bucking felled trees, culvert replacement or improvement, straw mulching, and seeding. Bulldozer line rehabilitation employed an excavator to pick up and move downed and cut logs and debris back into the cleared area. Trail rehabilitation involved clearing and installing water bars along affected trails to prevent further erosion during monsoon rains. Culverts were installed, repaired, or improved.

Trees burned almost completely through but which remained standing after the fire represented a public safety hazard (Froehlich 1996). Hazard trees were identified and dropped. Trees too dangerous to fall by chainsaw were rigged with small explosive charges and blasted down. A portion of smaller (<16 inches in diameter breast height)(dbh) trees felled during the incident were bucked into firewood-sized logs and removed to the roadside. The public was allowed and encouraged to remove logs to help reduce the fuel load along the roadside as well as open sites to encourage new vegetative growth.

Approximately 570 acres of intense burn, steep slopes, and or high erosion potential were seeded by helicopter or with manual spreaders to prevent soil loss. Beardless barley seed (*Hordeum vulgare*) was chosen due to quick germination time and past history of not being persistent beyond two years in high mountain ecosystems. Small diameter (< 9 inches dbh), blackened, dead trees were contour-felled on 390 of the 570 acres. Approximately 130 acres of the area with contour felling were also mulched with certified weed-free straw after seeding to further protect against erosion and soil loss (Froehlich 1996).

STATUS OF THE SPECIES

1. Mt. Graham red squirrel (*Tamiasciurus hudsonicus grahamensis*)

Most of the background information contained in this biological opinion is from the Mt. Graham Red Squirrel Recovery Plan (U.S. Fish and Wildlife Service 1993). The Mt. Graham red squirrel

(*Tamiasciurus hudsonicus grahamensis*) was listed as an endangered species pursuant to the Endangered Species Act on June 3, 1987 (52 FR 20997). Critical habitat for this subspecies was designated on January 5, 1990 (55 FR 425). Critical habitat occurs in three areas in the Pinaleno Mountains; they are referred to as Hawk Peak-Mt. Graham, Heliograph, and Webb Peak. These areas are irregularly shaped and cover a total of approximately 2,000 acres (800 hectares). These three designated areas contain major concentrations of the Mt. Graham red squirrel and habitat necessary to its survival. The major constituent element is dense stands of mature spruce-fir forest.

The Mt. Graham red squirrel (hereafter referred to as red squirrel) is a small, grayish-brown arboreal rodent with a rusty to yellowish tinge along the back. The tail is fluffy and the ears are slightly tufted in winter. In summer, a black lateral line separates the upper parts from the white underparts. The subspecies is one of two that occur in Arizona. First described in 1894 by J.A. Allen, the type specimen of the species is from the Pinaleno Mountains, Graham County, Arizona. It was designated as a subspecies based on pelage characteristics and its isolation from other populations for at least 10,000 years. The Mt. Graham red squirrel is slightly smaller in several standard measurements than the other subspecies, the Mogollon red squirrel, *T. h. mogollonensis*, that occurs in Arizona. Although Hoffmeister (1986) thought the Mt. Graham red squirrel subspecies was not strongly differentiated from the Mogollon red squirrel, the subspecies designation was retained by both Hall (1981) and Hoffmeister (1986). Recent research with both protein electrophoresis (Sullivan and Yates 1995) and mitochondrial DNA (Riddle *et al.* in press) has provided data which, in conjunction with morphological and ecological considerations, has demonstrated that the Mt. Graham red squirrel is a distinct population that likely deserves subspecific status.

Although the red squirrel has historically been restricted to a relatively small area, both its range and numbers have declined during the past century. Early accounts of species abundance used descriptions such as "common" and "abundant." By the 1950s, the population was described as "not abundant anyplace in the Mountains." By the mid-1960s it was rare enough to be considered extirpated. The red squirrel once occupied the westernmost peaks of the range (West Peak and Blue Jay Peak), but no additional records of red squirrels from the western portion of the range have been verified since the 1970s. Although not well documented, the decline of the red squirrel may be attributable to the expansion of logging operations in the Pinaleno Mountains and/or introduction of tassel-eared squirrels (*Sciurus aberti*). By 1973, most accessible and marketable timber had been cut, altering the age structure and density of much of the red squirrel's habitat. Logging operations and road building to accommodate timber harvests resulted in windthrow that destroyed additional red squirrel habitat. Additional losses of old-growth coniferous forest resulted from both natural and human-caused fires, ice storms, recreational development, road construction, and establishment of other structures. These direct losses reduced the amount of habitat and resulted in forest fragmentation that may have reduced the quality of habitat. This fragmentation may have isolated some pockets of the red squirrel population and prevented successful dispersal and/or movements between red squirrels in different areas, thus reducing genetic flow within the population.

The red squirrel inhabits only the Pinaleno Mountains of Graham County, Arizona, and its entire range is within the Safford Ranger District of the Coronado National Forest. This species resides in upper elevation mature to old-growth associations in mixed conifer and spruce-fir associations above approximately 2,425 meters (8,000 feet). It may inhabit drainage bottoms where the mixed conifer association reaches lower elevations. Historically, the red squirrel was common above 2,590 meters (8,500 feet) but is currently seldom found below 2,804 meters (9,200 feet). Currently, the highest densities of middens are in the upper elevation Engelmann spruce (*Picea engelmanni*) and corkbark fir (*Abies lasiocarpa* var. *arizonica*) associations. Lower densities of middens are found in mixed-conifer stands dominated by Douglas-fir (*Psuedotsuga menziesii*), with white fir (*Abies concolor*) and Mexican white pine (*Pinus strobiformis*) as sub-dominant tree species, and with little or no spruce. The transition between the two associations occasionally contains red squirrel densities equal to those in the spruce-fir associations. The spruce-fir association is generally found at elevations above approximately 3,110 meters (10,200 feet), although it extends lower on north-facing slopes. The transition varies widely in elevation depending upon aspect but generally grades into mixed-conifer associations with little or no Engelmann spruce and/or corkbark fir, at about 2,835 meters (9,300 feet) elevation. Mixed-conifer associations extend down to approximately 2,460 meters (8,000 feet) elevation.

The red squirrel is highly territorial (U.S. Fish and Wildlife Service 1993). They occupy and maintain middens (cone debris piles used for winter food caching). Occasionally, conditions arise where more than one red squirrel occupies a midden or a red squirrel uses more than one midden. Typically, the same midden will be used and reused in succeeding generations of red squirrels, and the use of middens becomes historical to some degree. Habitat suitability for the red squirrel depends on the ability of the forest to produce reliable and adequate conifer cone crops for food as well as microclimate conditions suitable for storage of closed cones in middens. These conditions have been met in red squirrel habitats by mature to old-growth stands with closed canopies. Elements that increase the quality of habitat are downed logs, snags, and interlocking branch networks. These habitat characteristics provide red squirrels with adequate food resources, perching, storage and nesting sites, runways that allow cone retrieval in the winter, and escape routes for the avoidance of predators. These red squirrels may be particularly selective about midden placement in order to avoid the negative effects of insolation. Canopy closure from the top and sides of trees appears to be a crucial element of habitat selection for midden sites among western subspecies of red squirrels. A midden's microclimate is an important factor in red squirrel population; the midden should not become too dry or the cones stored inside will not keep refrigerated and the red squirrel will not be able to rely on them through the winter months. Mt. Graham red squirrel midden locations in the spruce-fir and transition associations are found in forest patches that show unusually dense foliage volumes and canopy cover. Mt. Graham red squirrels place their middens in stands with high canopy cover, high foliage volume, and large amounts of dead and downed wood. The same characteristics are preferred in all vegetation associations.

Habitat analysis reported by the Forest Service in 1988 (U.S. Fish and Wildlife Service 1993) determined that 4,750 hectares (11,733 acres) of the 9,083 hectares (22,435 acres) that occurs above 2,425 meters (8,000 feet) was suitable red squirrel habitat. An initial estimate of 444 total midden areas was derived. Another 1986 evaluation of habitat capability, using a computer

Habitat Capability Model, produced an estimate that the existing habitat could support up to 502 red squirrels (U.S. Fish and Wildlife Service 1993). Based on information as of 1991, the Forest Service estimated current and future habitat capability for the Pinaleno Mountains using a Habitat Capability Model. The estimate suggested that under optimal conditions, the existing habitat could support approximately 650 red squirrels.

Updated information provided to the Service by the Forest Service (Genice Froehlich pers. comm. 1999) appears in Table 1. Middens by Habitat, and Table 2. Middens by Elevation, below. The total number of accumulated middens is 1122 (current middens are at 865, removed middens are at 257). The "Removed" column notes middens removed from database; these middens are not used for population extrapolation.

Table 1. Middens by Habitat

HABITAT	TOTAL	CURRENT	REMOVED
Mixed conifer	317	265	52
Ecotone	417	325	92
Spruce-Fir	374	261	113
Unknown	14	14	*

* This is blank because new middens discovered during last Fall Census have not yet been revisited to determine habitat type as of March, 1999.

Table 2. Middens by Elevation

ELEVATION	TOTAL	CURRENT	REMOVED
< 9000 feet	378	238	140
9000 to 9499 feet	295	261	34
9500 to 9999 feet	273	219	54
> 10,000 feet	176	147	29

The Pinaleno Mountains have been altered by natural and human events and activities; clearing, opening, and fragmentation of forested lands due to historic logging operations, summer home recreational site development, historic homesteading and agriculture, road building, forest management actions, astrophysical site development, and wildfire have all occurred in the species' range. Suitable red squirrel habitat has been reduced by these activities to approximately 4,680 hectares (11,700 acres). Of this, 1,093 hectares (2,700 acres) are currently considered to be good to excellent quality. Mannan and Smith (1991) predicted developments that open the forest canopy, remove large trees, or reduce amounts of dead and downed wood will reduce the number of potential middens for red squirrels in the Pinaleno Mountains.

Population ecology and survival rates of the red squirrel are largely unknown. High mortality of red squirrels likely occurs between their weaning and first reproduction ages, followed by a plateau in adult mortality, ending in an increased mortality in older age classes. Survival rates likely vary markedly over years, and are presumably related to the supply of closed cones available for storage. Population estimates have been derived for the years 1986-1998 (Genice Froehlich, pers. comm. 1998) and the annual estimates obtained ranged from a low of 146 to a high of 549 red squirrels. Spring estimates range from 146 to 462 red squirrels and fall estimates range from 191 to 549 red squirrels. This is described in the following table, **Table 3. Results of the Mt. Graham Red Squirrel Population Estimates.**

Table 3. Results of the Mt. Graham Red Squirrel Population Estimates

SURVEY	SAMPLE SIZE	CONSERVATIVE	OPTIMISTIC
Spring 86	207	348+/- 55	not computed
Fall 87	150	235+/- 40	not computed
Spring 88	45	210+/- 62	not computed
Fall 88	45	194+/- 62	258+/- 62
Spring 89	166	146+/- 29	221+/- 32
Fall 89	267	191+/- 15	204+/- 15
Spring 90	271	152+/- 15	169+/- 16
Fall 90	396	260+/- 7	265+/- 7
Spring 91	208	272+/- 13	280+/- 13
Fall 91	236	380+/- 16	400+/- 17
Spring 92	250	370+/- 16	383+/- 16
Fall 92	217	306+/- 16	355+/- 19
Spring 93	210	223+/- 31	301+/- 31
Fall 93	231	365+/- 22	385+/- 22
Spring 94	234	375+/- 18	372+/- 19
Fall 94	246	409+/- 11	428+/- 11
Spring 95	239	283+/- 12	352+/- 12
Fall 95	251	391+/- 12	423+/- 12
Spring 96	246	291+/- 10	323+/- 12
Fall 96	254	360+/- 12	402+/- 12
Spring 97	265	356+/- 12	376+/- 12
Fall 97	305	364+/- 12	420+/- 11
Spring 98	251	462+/- 11	492+/- 11
Fall 98	238	549+/- 11	583+/- 11

2. Mexican spotted owl (*Strix occidentalis lucida*)

The Mexican spotted owl (*Strix occidentalis lucida*) (hereafter referred to as MSO) was proposed for listing on November 4, 1995, (56 CFR 56344) and listed as threatened on March 16, 1993, (58 FR 14248). The MSO was originally described from a specimen collected at Mount Tancitaro, Michoacan, Mexico, and named *Syrnium occidentale lucidum*. It was later assigned to the genus *Strix*. Specific and subspecific names were changed to conform to taxonomic stands and the subspecies became *S. o. lucida*. The American Ornithologists' Union currently recognizes three spotted owl subspecies, including the California (*S. o. occidentalis*), the Mexican (*S. o. lucida*), and the Northern (*S. o. caurina*).

The following biological information comes from the 1995 MSO Recovery Plan. The MSO is mottled in appearance with irregular white and brown spots on its abdomen, back, and head. The spots of the MSO are larger and more numerous than in the other two subspecies, giving it a lighter appearance. Unlike most owls, all spotted owls have dark eyes. Several thin white bands mark an otherwise brown tail. Distinguished from the California and northern subspecies chiefly by geographic distribution and plumage, the MSO occupies the largest geographical range. Its range extends from the southern Rocky Mountains in Colorado and the Colorado Plateau in southern Utah southward through Arizona and New Mexico, and discontinuously through the Sierra Madre Occidental and Oriental to the mountains at the southern end of the Mexican Plateau.

Using starch-gel electrophoresis to examine genetic variability among the three subspecies of spotted owls, Barrowclough and Gutierrez (1990) found the MSO to be distinguishable from the other two subspecies by a significant difference in allelic frequency at one locus. They concluded this genetic variation, which suggests prolonged geographic isolation of the Mexican subspecies, indicates the MSO may represent a species distinct from the California and northern spotted owls.

The current known range of the spotted owl extends north from Aguascalientes, Mexico, through the mountains of Arizona, New Mexico, and western Texas, to the canyons of southern Utah and southwestern Colorado and the Front Range of central Colorado. Although this range covers a broad area of the southwestern United States and Mexico, much of this species' distribution within this range is unknown. This is especially true in Mexico where much of the owl's range has not been surveyed. Information gaps occur for MSO distribution within the United States. This owl apparently occupies a fragmented distribution throughout its United States range, corresponding to the availability of forested mountains and canyons, and in some cases, rocky canyon lands.

The U.S. Forest Service is the primary administrator of lands that support MSO in the United States. According to the MSO Recovery Plan (U.S. Fish and Wildlife Service 1995), 91 percent of owls known to exist in the United States between 1990 and 1993 occur on land administered by the Forest Service (U.S. Fish and Wildlife Service 1995). The majority of known owls have been found within Region Three of the Forest Service, which includes 11 National Forests in New Mexico and Arizona. Forest Service Regions Two and Four, including two National Forests in Colorado and three in Utah, support fewer owls.

The range of the United States population of the MSO is divided into six recovery units (RUs) as discussed in Part II. B. of the 1995 MSO Recovery Plan, with an additional five RUs designated in Mexico. While the Plan provides distribution, abundance, and density estimates by RU, a reliable estimate of the numbers of owls throughout its entire range is not currently known due to limited information. MSO surveys conducted from 1990 through 1993 indicate the species persists in most locations reported prior to 1989, with the exception of riparian habitats in the lowlands of Arizona and New Mexico, and all previously occupied areas in the southern states of Mexico. Increased survey efforts have resulted in additional sightings for all RUs.

Fletcher (1990) calculated 2,074 MSO existed in Arizona and New Mexico in 1990 using information gathered by Region Three of the Forest Service. Fletcher's calculations were modified by McDonald *et al.* (1991), who estimated a total of 2,160 MSO in the United States. However, these numbers are not reliable estimates of current population size for a variety of statistical reasons. While the number of MSO throughout its range is not currently known, the Plan reports an estimate of MSO sites based on 1990-1993 data. An owl "site" is defined as a visual sighting of at least one adult owl or a minimum of two auditory detections in the same vicinity in the same year. Surveys from 1990 through 1993 indicate one or more MSO were observed at a minimum of 758 sites in the United States and 19 sites in Mexico. The greatest concentration of known MSO sites in the United States occurs in the Upper Gila Mountain (55.9 percent), followed by the Basin and Range-East (16.0 percent), Basin and Range-West (13.6 percent), Colorado Plateau (8.2 percent), Southern Rocky Mountain-New Mexico (4.5 percent), and Southern Rocky Mountain-Colorado (1.8 percent) RUs. At best, total numbers in the United States may range from 777 individuals (assuming each known site was occupied by a single owl), to 1,554 individuals (assuming each known site was occupied by a pair of owls).

Past, current, and future timber-harvest practices in the Region Three of the Forest Service, in addition to catastrophic wildfire, were cited as the primary factors leading to listing of the MSO as a threatened species. Fletcher (1990) estimates 420,000 hectares (1,037,000 acres) of habitat were converted from suitable (providing all requirements of the owl, e.g., nesting, roosting, and foraging) to capable (once suitable but no longer so). Of this, about 78.7 percent, or 330,000 hectares (816,000 acres) was a result of human management activities, whereas the remainder was converted more or less naturally, primarily by wildfire. Another factor that may have or continue to lead to the decline of this species is lack of adequate regulatory mechanisms. The Plan notes forest management has created ecotones favored by great horned owls, and there is an increased likelihood of contact between spotted owls and great horned owls (a potential competitor and known predator). Increases in scientific research, birding, educational field trips, and agency trips, and recreational impacts are also likely to occur. There is potential for

increasing malicious and accidental anthropogenic harm. Based on short-term population and radio-tracking studies, and longer-term monitoring studies, an adult MSO has a probability factor of 0.8 to 0.9 to survive from one year to the next. Juvenile survival is considerably lower, with a probability factor of 0.06 to 0.29, although it is believed these estimates may be artificially low due to the high likelihood of permanent dispersal from the study area, and the lag of several years before marked juveniles reappear as territory holders and are detected as survivors through recapture efforts (White *et al.* 1995). Little research has been conducted on mortality causes to MSO, but predation by great horned owls, northern goshawks, red-tailed hawks and golden eagles, starvation, and accidents (such as electrocution) or aircraft and vehicle collisions may all be contributing factors.

Little is known about the reproductive output for the MSO. It varies both spatially and temporally (White *et al.* 1995), but the subspecies demonstrates an average annual rate of 1.001 young per pair. There is inadequate data at this time to estimate population trends. Little confidence in initial estimates has been expressed. This is due to its reliance on juvenile survival rates which are believed to be biased low, and due to the insufficient time period over which studies have been conducted.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Mt. Graham red squirrel

All Mt. Graham red squirrel habitat is located within the Pinaleno Mountains. These mountains contain approximately 22,436 acres of possible red squirrel habitat. Approximately 11,733 acres were classified as potential red squirrel habitat. Approximately 3,240 of the 11,733 acres are within the fire perimeter (Froehlich 1996). High intensity burn (defined by the Forest Service as >80 percent of vegetation killed) areas totaled 528 acres of red squirrel habitat. Moderate burn (defined by the Forest Service as 40 to 80 percent of trees killed) areas totaled 88 acres of red squirrel habitat. Other burn areas (defined by the Forest Service as where only very small patches of crown burn occurred with some understory burn, or no burned areas at all, but which can include up to 40 percent mortality of trees) totaled 1,934 acres of red squirrel habitat. Thus, 21 percent (2,550 acres) of the existing potential red squirrel habitat received some form of damage from the Clark Peak fire. Approximately 5.2 percent (616 acres) of all potential red squirrel habitat was reduced from occupied to capable due to high intensity to moderate burn. The fire resulted in 7.8 percent (485 acres) of the highest value (Habitat Management Zones One to Three) red squirrel habitat on the mountain subjected to a moderate to high intensity burn (Froehlich 1996).

Fire suppression activities (including burning out and backfiring) impacted red squirrel critical habitat. Of the 1,920 acres of designated critical habitat, 210 acres (10.9 percent) were inside the perimeter of the Clark Peak fire. Ninety-two acres (4.8 percent of all critical habitat) burned at high intensity while none were burned moderately. The primary constituent element identified for red squirrel critical habitat is dense stands of mature spruce-fir forest. This primary constituent element was probably completely destroyed or adversely modified within the confines of the critical habitat acreage (92 acres) defined above. All acres of critical habitat lost are located within the red squirrel refugium established as part of the 1988 biological opinion and the Arizona-Idaho Conservation Act authorizing astrophysical development in the Pinaleno Mountains.

At least three previous Federal projects have been determined to adversely affect the red squirrel. The July 14, 1988, biological opinion (U.S. Fish and Wildlife Service 1988) stated implementation of the Coronado National Forest Plan was not likely to jeopardize the continued existence of the red squirrel. The same biological opinion stated the establishment of the seven telescope Mt. Graham Observatory on Emerald and High Peaks was likely to jeopardize the continued existence of the squirrel. Once a decision was made regarding the Astrophysical Area, it was incorporated into the Coronado National Forest Plan by the Forest Service. Reasonable and prudent alternatives to avoid jeopardizing the red squirrel and reasonable and prudent measures to eliminate or minimize incidental take for the red squirrel were provided in the biological opinion.

The November 7, 1990, biological opinion (U.S. Fish and Wildlife Service 1990) for the Pinaleno Mountains Recreation Projects stated the projects were not likely to jeopardize the continued existence of the red squirrel. An incidental take statement was included and reasonable and prudent measures were provided in the biological opinion to address that take.

The February 23, 1994, biological opinion (U.S. Fish and Wildlife Service 1994) for the Noon fire emergency action stated the fire emergency action was not likely to jeopardize the continued existence of the red squirrel. Incidental take was recorded and reasonable and prudent measures were provided in the biological opinion to address that take.

The December 19, 1997, biological opinion (U.S. Fish and Wildlife Service 1997) for the Land and Resource Management Plans, as Amended, for Eleven Forests and National Grasslands in the Southwestern Region, stated the "continuation of management direction in the LRMP is not likely to jeopardize the continued existence of the Mt. Graham red squirrel and is not likely to destroy or adversely modify designated critical habitat."

One road-killed squirrel was discovered August 1996, near the Columbine Visitor Center. Two road-killed red squirrels were discovered in 1997. Three road-killed red squirrels were discovered at various locations on Swift Trail (one in May, one in June, and one in September, 1998), and the Forest Service immediately notified the Service and reinitiated formal consultation regarding incidental take (reference number 2-21-86-F-075).

Mexican spotted owl

A total of 209 projects have been formally consulted on in Arizona and New Mexico since August, 1993. These include 67 where incidental take of MSO was anticipated. Those projects resulted in the anticipated incidental take of more than 139 MSO. The Forest Service has formally consulted on 200 of those projects. In addition, the Bureau of Indian Affairs has consulted on one timber sale on the Navajo Reservation which resulted in an anticipated take of five MSO and one highway reconstruction project which resulted in an anticipated take of two MSO. The Federal Highway Administration has consulted on one highway project that resulted in an undetermined amount of incidental take. Take associated with this specific project will be determined following further consultation.

Additionally, the biological opinion for the Kachina Peaks Wilderness Prescribed Natural Fire (PNF) Plan (#2-21-94-F-220) determined thresholds for incidental take and direct take as follows: 1) one spotted owl or one pair of spotted owl adults and/or associated eggs/juveniles; 2) harm and harassment of spotted owls located in up to two PACs per year; 3) disturbance to spotted owls and habitat modification of a total of seven PACs during the life of the Kachina Burn Plan related to management ignited fire occurring in PACs for which the nest site information is three or more years old; 4) harm and harassment of spotted owls and habitat caused by PNF for which adequate surveys have not been conducted, and; 5) harm and harassment of spotted owls and habitat modification of up to one PAC and 500 acres of potential nest/roost habitat caused by wildfire as an indirect result of PNF during the life of the Kachina Burn Plan.

The Department of the Navy consulted on an observatory project with an anticipated take of one MSO. Consultation with Langley Air Force Base (#2-22-96-F-334) for overflights in both New Mexico and Arizona concerning German Air Force operations at Holloman Air Force Base in New Mexico (for flights over the southern half of New Mexico, southwest Texas, and 40 square miles in eastern Arizona), determined that incidental take of MSO would occur due to harassment. The precise level of the take was impossible to predict due to lack of adequate data. However, incidental take is considered to be exceeded if 5 percent of monitored PACs are believed to have become nonfunctional through harassment from the overflight. Bandelier National Monument (#2-22-95-F-532) consulted on a prescribed fire project with an anticipated direct mortality of one MSO and no more than one PAC buffer area burned.

The Clark Peak fire occurred within the Basin and Range-West Recovery Unit (RU), as described in the MSO Recovery Plan. This RU includes most of southern Arizona and a small portion of southwestern New Mexico. Owl territories occur in both heavily forested terrain and in areas with hardwood and conifer stringers dominated by Madrean Evergreen woodland. The subpopulation occurs in widely distributed territory clusters of varying sizes. The Sky Island Division may represent an important demographic link between the Mogollon Province biomes and those in the Sierra Madre Occidental. Demographic persistence and connectivity within the Division and between divisions may be hindered by the compounding factors of naturally disjunct habitat and long dispersal distances.

Telephone conversations between the Service and the Forest Service indicate acreage conversion from the terms "suitable" and "capable" to MSO Recovery Plan terms "restricted", "protected",

and "other", for the following paragraph, is not possible at this time. Some inaccuracies remain in the system used for computing and ground-proofing is required at a scale the Forest Service cannot currently provide.

The risk of catastrophic habitat loss due to fire is moderately high. In the past four years, the Noon and Arcadia wildfires have resulted in the loss of MSO habitat. The Noon fire of 1993 was estimated to have burned 620 acres of which 316 acres were considered suitable MSO habitat and 144 acres were considered capable MSO habitat. It was estimated that 60 percent burned at low intensity or not at all, 20 percent burned with a medium intensity, and 20 percent burned at high intensity. The Arcadia Campground fire in 1995 burned approximately 150 acres of suitable MSO habitat. The fire was a low intensity fire and it is estimated that approximately 10 percent of the trees in the area were killed or scorched with the potential to kill. The Clark Peak fire of 1996 burned an estimated 2,650 acres of which 1,480 were suitable spotted owl habitat and 1,170 were in capable spotted owl habitat. Of the 1,480 acres of suitable habitat, 1,030 acres were burned intensely, while 450 were burned moderately. Of the 1,170 acres of capable habitat, 980 were burned intensely, while 190 were burned moderately (Froehlich 1996).

Although the Coronado National Forest does not have an active timber program, localized projects such as road construction, mining, recreation and other activities may adversely impact Protected Activity Centers (PACs) established for known MSO sites and restricted habitat as defined by the MSO Recovery Plan.

Within the Basin and Range-West RU in which the emergency action occurred, MSO are located in rocky canyons or in several forest types at elevations ranging from 1,125 to 2,930 meters (3,690 to 9,610 feet) of the Atascosa-Pajarito, Santa Rita, Santa Catalina, Patagonia, Whetstone, Galiuro, Huachuca, Chiricahua, Pinaleno, Superstition, Sierra Ancha, Mazatzal, and Bradshaw Mountains, Arizona. Below 1,300 meters (4,264 feet), MSO are found in steep canyons containing cliffs and stands of live oak, Mexican pine, and broadleaf riparian vegetation (Ganey and Balda 1989). Above 1,800 meters (5,904 feet), MSO are found in mixed conifer and pine-oak forests. Mid-elevation observations included sites with Arizona cypress and the other forest types previously mentioned (U.S. Fish and Wildlife Service 1995).

Currently, there are 37 MSO PACs designated in the Pinaleno Mountains. Five nest sites are known in Pinaleno MSO PACs. The PACs essentially ring the mountain range in the mixed conifer and transition zones.

EFFECTS OF THE ACTION

The effects of the action are those that are a result of the activities undertaken by the Forest Service in response to the wildfire. Although the effects of the fire must be, and have been, addressed in the environmental baseline, the wildfire itself is not part of the action under consultation.

Mt. Graham red squirrel

Direct effects due to suppression include burnout and backfiring operations; mortality due to, or injury from, falling trees; habitat destruction along bulldozer lines (cone-producing trees killed, midden piles moved and/or destroyed, snags pushed down and removed, logs removed, stand structure altered, topsoil removed); handline construction resulting in understory habitat modification (cutting small trees and logs cut and bucked, duff removed); tree falling (cone-producing trees lost, potential snags and logs lost, canopy opened); and increased potential for road-kill of red squirrels from increased traffic (Froehlich 1996). Interrelated and interdependent effects of suppression include the protection of an unquantifiable amount of red squirrel habitat which would have otherwise been lost but for the suppression decisions and actions (USFS 1999).

Additional effects include midden microclimate alteration, midden disturbance, and increased edge effects along bulldozer lines; decreased food source due to cutting live mature trees; decreased photosynthesis from dust; increased erosion; potential for the off-road-vehicle-driving public to use bulldozed lines as roads; and a temporary red squirrel dispersal barrier across Swift Trail. Other suppression actions such as water and retardant drops, smoke, and noise, may have impacted red squirrels, their habits or their habitat.

Burnout operations may include backfiring from a control point or line, falling dangerous trees and/or snags with potential to spread flames up slopes, clearing or piling brush and downed fuel near the control feature, and limbing and thinning trees to reduce ladder fuels. In certain situations, pre-burn preparation is not possible to implement, and the line is set on fire downslope to burn fuels in the path of an approaching wildfire. This consumes and removes fuels, reducing or putting out the fire as the two fire fronts meet in the blackened, fuel-depleted area below the line. Burnout operations occurred all along the perimeter of the fire along Swift Trail. The distance from Moonshine Creek to Riggs Lake is 7.3 miles. If the burnout is estimated to reach approximately 50 yards into the forest below the line before meeting the main wildfire, the area burned out would cover approximately 130 acres. At least one midden (observed on a site visit) is known to have been destroyed by a burnout operation. The Forest Service is unable to provide any further information regarding middens affected by burnout due to the difficulty of differentiating effects from burnout to those of the wildfire once the fires merged.

Approximately 10.3 miles of line (hand and bulldozer) was constructed in red squirrel habitat. The Forest Service was unable to provide an estimate of the acreage devoted to fire control line construction, or a breakdown of the amount attributable to each type. Thus, the following estimates were made by the Service. Assuming that the width of a bulldozer line is 12 feet, the total acreage committed to clearing during line construction in red squirrel habitat could be as much as 15 acres (0.12 percent of all potential habitat). Hand- and bulldozer line totaling 2.4 miles was built in red squirrel critical habitat, including line constructed in an abandoned fuelbreak line that was previously revegetated under the terms of a reasonable and prudent alternative of a prior biological opinion. As much as 3.5 acres of critical habitat (0.17 percent of all critical habitat) were devoted to line construction. Of the 2.4 miles, approximately 0.75 miles (1.1 acres) were new line constructed in critical habitat (0.06 percent of all critical habitat). The Service believes at least approximately 150 acres (1.3 percent) of red squirrel habitat was lost to suppression actions.

A "border zone" of fuels surrounding the observatory and containing red squirrel critical habitat was pre-treated as part of the fire suppression action. Pre-treatment fuels removal was similar to what was performed in other areas, except greater care was taken to leave as many large logs and snags as possible, and no pre-burning occurred (Froehlich 1996). Large logs in the latter stages of decay were not removed, and most snags were left standing. Log piles found in this zone were removed, along with small trees occurring in clumps in the understory that were feared to provide a fuel ladder from the forest floor into the canopy. Trees with limbs that contributed to the fuels ladder were limbed. The pre-treated zone comprised less than 1.0 acre. Fuel wood removed from the area was approximately 60 to 80 cords. The canopy closure in the area remains continuous and greater than 85 percent (Froehlich 1996).

The Forest Service (Froehlich 1996, 1999) believes post-fire rehabilitation of bulldozer lines restored the forest floor to a more suitable state for recovery of habitat for red squirrels and prevented these corridors from becoming permanent recreation access routes in the future. Seeding, contour tree falling, and mulching were only conducted in areas that were burned completely black. A total of approximately 50 acres of red squirrel habitat were seeded, 390 acres were seeded and contour tree felled, and 130 acres were seeded, contour tree felled, and mulched. Rehabilitation was only feasible on slopes generally less than 40 percent.

Results from a post-fire survey of middens revealed that 168 middens (26.9 percent of 624 middens known to exist before the fire) were located within the fire perimeter. Fifty-three middens (8.4 percent of known middens) were burned (usually completely) in the fire, and another 9 middens (1.4 percent) experienced fire within a distance of 50 feet (for a total of 9.8 percent of known middens). Forty-six middens (7.3 percent of known middens) of the above 624 middens experienced suppression activities within 50 feet. Twenty-eight middens (4.4 percent of known middens) exhibited direct impacts from suppression actions. Four middens which did not experience fire at or near the midden were subjected to suppression actions. The Forest Service (Froehlich 1996) stated they defined direct effects to middens as "those suppression actions which altered preferred habitat features within 50 feet of a midden." Eleven middens had negative direct effects from suppression and were considered unsuitable for red squirrel use. Of those 11 middens, four listed suppression actions as the primary reason for red squirrel unsuitability. The remaining seven middens listed both suppression and wildfire effects as reasons for red squirrel unsuitability. As stated in the environmental baseline section, the Forest Service (Froehlich 1996) estimated 15 red squirrels were killed or injured due to the Clark Peak fire and fire suppression actions; thus, it was not possible to determine a population loss of squirrels due only to suppression actions.

Indirect impacts are assumed for almost every midden where machinery passed nearby (Froehlich 1996), but the Forest Service considered such impacts insignificant and/or negligible. They also stated because almost all bulldozer lines were built along old abandoned roads, edge effects were usually not increased much beyond what was already present.

Rehabilitation began during wildfire control operations. The non-native grass (beardless barley) selected and used for rehabilitation is non-persistent in high-elevation situations, gradually disappearing over two to three years. This has resulted in vigorous regrowth response from

native grasses (Froehlich 1999). Where red squirrels were still removing cones from burned-over middens, rehabilitation actions (mulching and contour felling) did not take place within 50 feet of the area.

The March 1998 Final Endangered Species Consultation Handbook (U.S. Fish and Wildlife Service 1998) indicates a biological opinion on an emergency action will include a section documenting previous Service recommendations provided during the emergency. The Forest Service (McGee *in litt* 1997) stated the Forest Service received the following guidelines in telephone conversations: avoid middens, minimize habitat destruction, err on the side of life and property, and endangered species concerns were secondary to the primary considerations of protection of life and property. There is no documentation in the Clark Peak Fire file regarding recommendations made by the Service, but the above was confirmed by Service personnel (Tom Gatz pers. comm. 1996).

The Service recognizes the Forest Service's expertise in firefighting and recognizes the primary considerations in firefighting are protection of life and property. Emergency fire suppression for a fire of the severity, size and intensity of the Clark Peak fire presents many difficulties and complex, challenging situations requiring immediate decisions. The Service believes the Forest Service acted, as much as possible under the extremes of the situation, to protect red squirrels and their habitat, and implemented Service recommendations provided to minimize incidental take of red squirrels during the emergency action. The Service believes without the Forest Service's aggressive fire suppression actions, far more red squirrel habitat may have been lost to the wildfire. Suppression actions did necessarily impact the red squirrel and its habitat, but were vital to meet the objectives of protection of life and property.

Mexican spotted owl

Most of the fire burned within MSO suitable nesting habitat. There were approximately 4,860 acres of suitable nesting habitat. Of this, 1,030 acres burned hot and 450 acres burned moderately. The fire burned within 1,170 acres of capable habitat. Of this, 980 acres burned hot and 190 acres burned moderately. While at least part of the suitable nesting habitat that burned hot was likely reduced to capable nesting habitat, the fire burned in scattered and extremely patchy patterns. The Forest Service has not been able to determine all suitable and capable nesting habitat that might exist in the Pinaleno Mountains, but it does likely contain more than 15,000 acres of suitable nesting habitat for MSO (Froehlich 1999).

Fire suppression actions that impact MSO are essentially the same as those that impact the red squirrel. Cutting large diameter trees and falling large diameter snags could reduce the number of potential nesting sites for many years. Live and dead trees were cut or pushed in PACs, and bulldozer fireline construction removed large trees. None of the removed, large diameter trees were located in known roost and/or nest areas for MSO.

Nine PACs were impacted by the Clark Peak fire. Three PACs burned hot or moderate over less than two percent of their PAC (600 acres are designated for each PAC). Another three PACs

burned hot or moderate between 20 to 35 percent of their PAC. The final three PACs burned hot or moderate over greater than 45 percent of their PAC.

Noise from all air operations, especially low-flying aircraft dropping water or retardant, may have disturbed MSO. Rehabilitation activities during and after the fire may have impacted individual owls, owl pairs, or pairs and young. Less than five percent of the entire acreage of PACs inside the fire perimeter were impacted by rehabilitation actions.

While burned PAC areas are located mostly within the interior of the fire perimeter and outside the influence of suppression activities, suppression actions did adversely affect MSO and their suitable nesting and capable habitat. Trees (some greater than 24" dbh) in PACs were cut and pushed, possibly affecting roost and/or nest groves. The Forest Service estimated four MSO PACs were affected by such actions (Froehlich 1999).

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of ESA. The action area is completely contained within the Coronado National Forest. The Service knows of no State, local, or private actions that are reasonably certain to occur in the action area.

CONCLUSION

Mt. Graham red squirrel

After reviewing the current status of the Mt. Graham red squirrel, the environmental baseline for the action area, effects of the actions associated with the suppression of the Clark Peak fire, and the cumulative effects, it is the Service's biological opinion that the action, as described, is not likely to jeopardize the continued existence of the Mt. Graham red squirrel and is not likely to result in destruction or adverse modification of designated critical habitat such that it precludes recovery and survival of this species.

The Service believes the Clark Peak fire had the potential to push the red squirrel into extinction if immediate and decisive suppression decisions and actions had not been taken by the Forest Service. Critical habitat for red squirrel was adversely affected by suppression actions (such as firelines constructed in critical habitat, burnout operations, etc.). These actions did remove or destroy red squirrel middens. While middens were lost, the loss is anticipated to be recovered over a long-term recovery process, perhaps to be aided by agency projects, over time. Actions taken by the Forest Service to rehabilitate bulldozed firelines aided in the long-term process of habitat recovery.

Mexican spotted owl

After reviewing the current status of the Mexican spotted owl, the environmental baseline for the action area, the effects of the actions associated with suppression of the Clark Peak fire and the cumulative effects, it is the Service's biological opinion that the action, as described, is not likely to jeopardize the continued existence of the Mexican spotted owl. Critical habitat is not designated for this species, thus critical habitat is not adversely modified or destroyed.

Fire suppression decisions and actions did impact MSO suitable nesting and capable nesting habitat and disturbed MSO pairs and/or young, and that incidental take did occur to MSO. It is the Service's belief the Clark Peak fire would have adversely affected MSO and their habitat to a much greater extent had the Forest Service not made immediate and decisive fire suppression decisions and actions. While suitable nesting habitat was modified and some converted to capable, the loss is anticipated to be recovered over a long-term recovery process, perhaps to be aided by agency projects, over time. Rehabilitation of bulldozed firelines aided the long-term process of habitat recovery.

INCIDENTAL TAKE STATEMENT

Sections 4(d) and 9 of ESA, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

AMOUNT OR EXTENT OF TAKE

Mt. Graham red squirrel

The Service estimates 15 Mt. Graham red squirrels were taken as a result of suppression actions associated with the Clark Peak fire. The take was anticipated to be in the form of kill and harm to some combination of individuals and middens. Fifteen red squirrels considered taken by suppression actions is an estimate; the actual number of red squirrels taken due to fire suppression actions is not possible to determine.

Mexican spotted owl

The Service estimates eight Mexican spotted owls (or four pairs) were taken as a result of suppression actions associated with the Clark Peak fire. The take was anticipated to be in the

form of harm. The Forest Service (Froehlich 1996) stated four MSO PACs were affected by cutting and pushing over large trees in PACs. Such actions may have affected roost or nest groves of the Mexican spotted owl. If individual MSO were nesting close to areas where significant numbers of large trees were felled, and it is assumed that all PACs were occupied by pairs that may have had breeding affected by suppression activity, then eight MSO are assumed to have been taken during suppression actions.

Effect of Take

In the accompanying biological opinion, the Service determines this level of estimated take of Mt. Graham red squirrels has not likely resulted in jeopardy to the species or destruction or adverse modification of critical habitat to preclude the recovery and existence of the red squirrel. In the accompanying biological opinion, the Service determines this level of estimated take of Mexican spotted owls has not likely resulted in jeopardy to the species.

Notice: While the incidental take statement provided in this consultation satisfies the requirements of the Endangered Species Act, as amended, it does not constitute an exemption from the prohibitions of take of listed migratory birds under the more restrictive provisions of the Migratory Bird Treaty Act.

Reasonable and Prudent Measures: None provided. Incidental take statements in emergency consultation do not include reasonable and prudent measures or terms and conditions to minimize take unless the agency has an ongoing action related to the emergency (U.S. Fish and Wildlife Service 1998).

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of ESA directs Federal agencies to utilize their authorities to further the purposes of ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The Service believes additional opportunities may exist during fire suppression operations to minimize impacts and protect habitat for listed species and includes the following conservation recommendations:

Mt. Graham red squirrel

1. The Forest Service should prepare and implement instructions to be included in the Delegation of Authority letter given by the Line Officer to the Incident Commander of any fire in, or likely to enter, Mt. Graham red squirrel habitat. Draft instructions should be prepared and submitted to the Service for review and modification as appropriate. The Service recommends the following components be addressed and incorporated in the fire

suppression instructions, and that the intent is to prevent wildfire from reaching red squirrel habitat and/or to minimize impacts of suppression activities.

- a. All reasonable efforts should be made to avoid damage to red squirrel middens by any mechanical (e.g., bulldozer and handlines) firefighting equipment. Efforts to protect red squirrel middens are not reasonable if they place firefighters in danger.
- b. Create specific fire protection plans for the Columbine summer home site, Columbine Administrative Site, the astrophysical site, and other facilities in the Pinaleno Mountains. For example, a plan could address quantifiable fuel loading and fuel reduction objectives around facilities, expected evacuation needs and routes, anticipated suppression actions required for facility protection, readiness and storage of firefighting equipment maintained onsite, water sources near facilities, area equipment staging areas, etc.
- c. Continue red squirrel midden avoidance during placement of fire control lines and burnout operations, especially those lines constructed mechanically, in critical habitat when other alternatives exist. When this cannot be avoided, impacts to critical habitat should be minimized to the greatest extent possible in suppression strategies.
- d. Continue to avoid burnout in red squirrel habitat when other alternatives exist. When this cannot be avoided, impacts to red squirrel habitat should be minimized to the greatest extent possible in suppression strategies.
- e. Falling of designated hazard trees which are part of a red squirrel midden should be avoided unless they present a high probability of hazard along roads or trails.
- f. Continue to make protection of, and minimizing suppression impacts to, red squirrels, their middens, and habitat, a high priority in fire suppression decisions and actions. At least one journey-level wildlife biologist with both red squirrel and firefighting experience should be assigned as a Resource Advisor to all fires in the Pinaleno Mountains that escape initial attack. This biologist should have authority to provide the Incident Commander with relevant information to ensure impacts to red squirrels are avoided or minimized in accordance with other parts of this policy.
- h. Train a sufficient number of monitors, under the direction of the Resource Advisor, in red squirrel ecology and firefighting and ensure these trained people are available for assignment to each Division, ensuring impacts are avoided or minimized in accordance with other parts of this policy.
- i. Instruction on red squirrel ecology (e.g., habitat and midden recognition) and methods for avoiding or minimizing impacts to red squirrels and their habitat in accordance with other parts of this policy should be part of the annually scheduled

training for all fire personnel on the Safford Ranger District. It should also be included in the Southeast Arizona Zone (SEAZ) refresher course.

- j. A standardized form outlining the components of, the importance of, and means to avoid or minimize impacts to, red squirrels and their habitat should be included in all shift plans when a fire occurs in red squirrel habitat. The form should emphasize the importance of preventing all direct damage to middens and should be part of the Fire Management Action Plan for the Coronado National Forest.
 - k. Continue to conduct performance ratings of Incident Commanders to evaluate implementation of compliance of policy and direction.
 - l. Appropriate and sufficient contact points between the Forest Service and the Service should be identified and established to handle wildfires and emergency actions required to deal with them. Components of suppression activities that will be used or are used in the course of suppression, and their effects on red squirrels, should be described in writing to the Service as soon as possible after the emergency begins. Such descriptions should include the EFSA with a map and fire perimeter maps as they are produced.
 - m. Continue to mark critical habitat boundaries, when appropriate, on the fire map used for briefing and develop fire suppression strategies to avoid adverse effects to critical habitat when it does not preclude suppression efforts.
- 2) The Forest Service should add language to the Forest Service's Burned Area Emergency Rehabilitation plan that consider effects of rehabilitation efforts to the Mt. Graham red squirrel.
- a. Additional rehabilitation efforts should minimize negative effects and enhance positive effects to the red squirrel wherever possible.
- 3) The Forest Service should continue gathering information on the red squirrel.
- a. Regular monitoring of both the habitat and population of the red squirrel should continue. The red squirrel midden census efforts that have been conducted in the past years should continue to keep the data updated in a timely and consecutive fashion. Middens affected by the Clark Peak fire and fire suppression actions should continue to be monitored for persistence and/or occupancy for at least three years after the event.
- 4) The Forest Service should develop a long-term comprehensive fire management plan.
- a. This plan should address fuel loading, facility and structure protection for the various buildings on the mountain, long-term species habitat protection, and any other related issues that might come up during fire management and suppression activities. Such a plan should take into consideration the following:

i. Evaluation of the effectiveness of pre-treatment around facilities to reduce fire hazard in and around facilities (including fires moving towards facilities and potential of fires beginning in and moving away from them) compared to the effects of habitat modification to red squirrel habitat. Pre-treatment which would impact red squirrel critical habitat in the vicinity of a facility should only be undertaken when the Forest Service has determined that fire is an imminent threat to the facility. The Service recommends that for pre-treatment determined essential within Mt. Graham red squirrel critical habitat, measures such as those taken in the vicinity of the observatory during the Clark Peak fire should be incorporated in an effort to minimize impacts to the critical habitat to the greatest extent practicable.

ii. Evaluation and methodology of preventing fire spread into critical habitat.

iii. Listed recommended methods for long-term rehabilitation of intense burns in red squirrel habitat. Tree planting, native grasses seeding, line and road rehabilitation, and other methods should be considered.

iv. Specific structure evacuation and protection plans for all facilities that can be implemented in advance of an escaped fire situation should be considered.

v. Mt. Graham red squirrel habitat maintains a high fuel load. Although fuel management may be an effective means to deal with fire management in some cases, it may have limited utility in Mt. Graham red squirrel habitat where such habitat can be significantly affected by such measures. For instance, strategies for fuel management should retain an appropriate number of large snag and log components in the landscape. Fuel reduction projects should include a risk analysis that clearly displays possible adverse effects to Mt. Graham red squirrel habitat noting all activities proposed, proposed techniques for minimization of impacts, time frames for work, as well as benefits provided by a reduction in the threat of catastrophic fire over time and space.

Mexican spotted owl

1) For MSO, provisions similar to those described for the Mt. Graham red squirrel under the above conservation recommendations should be added to any and all fire suppression management plans the Forest Service develops and implements. These provisions should also include the mitigation measures provided by the Forest Service in the biological assessment and evaluation for MSO.

2) Survey of the four MSO PACs in the Pinaleno Mountains that were impacted due to suppression actions should be conducted per the protocol required for consultations.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

For further information, please contact Thetis Gamberg (x 230) or Tom Gatz (x 240) of my staff at 602/640-2720. Please refer to the consultation number 2-21-96-F-286 in future correspondence concerning this project.

Sincerely,

A handwritten signature in black ink, reading "David L. Harlow". The signature is fluid and cursive, with a long horizontal line extending from the end of the name.

David L. Harlow
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ES-PARD)
(Attn: Steve Chambers)
Director, Arizona Game and Fish Department, Phoenix, AZ
Regional Supervisor, Arizona Game and Fish Department, Tucson, AZ

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